INSTALLATION STRUCTURE FOR VEHICLE-MOUNTED UNIT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The entire disclosure of Japanese Patent Application No. 2002-224717 filed on August 1, 2002 including the specification, claims, drawings and summary is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] This invention relates to an installation structure for a vehicle-mounted unit, such as an electrical connection box, an electronic control unit, or peripheral devices or an audio system and the like in an automobile.

BACKGROUND OF THE INVENTION

[0003] Various kinds of units, such as an engine, suspensions, electrical equipment, electronic control devices, and riding equipment are installed on inner and outer sides of a vehicle body of an automobile or the like.

[0004] In the case where these various kinds of vehicle-mounted units are installed on a vehicle body, in particular, the interior of the vehicle body, vehicle-mounted units with a relative low necessity are disposed on an inner rear part of the interior of the vehicle body. Vehicle-mounted units with a relatively high necessity are disposed on a front part of the interior where a user of automobile can reach in view of a convenient operation for the user of automobile.

[0005] For convenience of explanation, a conventional installation for a vehicle-mounted unit will be described by referring to Figures 6A and 6B. Figure 6A is a front elevation view of a conventional installation structure for a PJB (vehicle-mounted unit). Figure 6B is a side

elevation view of the conventional installation structure for the PJB (vehicle-mounted unit).

[0006] For example, a junction box or a PJB (Printed-circuit-board Junction Box), in which electronic circuits and spliced circuits mounted on a printed board are contained in the vehicle-mounted unit is to be disposed on the inner part of the interior of the vehicle body. Since the PJB controls electrical circuits are not operated by the user of automobile, the PJB is attached to a standing wall surface 53 which is the innermost part of the interior of the vehicle body.

[0007] An example of the attaching process is shown in Figures 6A and 6B. As shown in Figures 6A and 6B, a rectangular configuration PJB 50 includes brackets 51 on an upper left side edge and a lower right side edge. Bolt through-holes 52 are provided in the respective brackets 51. Stud bolts 54 are secured perpendicularly on a standing wall surface 53 in an interior of a vehicle body. The stud bolts 54 are inserted into the bolt through-holes 52 and hexagonal nuts 55 are screwed onto the stud bolts 54 to attach the PJB 50 to the standing wall surface 53 in the interior of the vehicle body.

[0008] In the above installation structure for the vehicle-mounted unit such as the PJB 50, in which the stud bolts 54 are inserted into the bolt through-holes 52 in the brackets 51, directions for attaching and detaching the vehicle-mounted unit to and from the supporting bolts are parallel with axes of the bolts. In the case where the vehicle-mounted unit is removed from the vehicle body to repair or exchange the unit, the unit must always be drawn to a front side (a side opposite from an attachment surface of the vehicle-mounted unit) along the axes of the supporting bolts. This requires a working space in front of the vehicle-mounted unit.

[0009] In particular, in the case where the vehicle-mounted unit is disposed on the inner part of the interior of the vehicle body and the other devices are disposed in front of the vehicle-mounted unit, it is necessary to remove the other devices to obtain the working space. Such

removal work of the other devices is laborious, requires time, is troublesome and is low in efficiency. Furthermore, in this case, after a new or repaired vehicle-mounted unit is installed in the interior of the vehicle body, the other devices removed from the vehicle body must be attached to their original positions in front of the new or repaired vehicle-mounted unit. Heretofore, it is desirable to improve the efficiency of replacing such a unit.

SUMMARY OF THE INVENTION

[0010] In view of the above problems, an object of the present invention is to provide an installation structure for a vehicle-mounted unit that does not require a working space in front of a vehicle-mounted unit. The vehicle-mounted unit is detachably supported on supporting bolts in a direction perpendicular to the axes of the supporting bolts. The vehicle-mounted unit is readily, rapidly detachable from an inner part in an interior of a vehicle body. This enhances work efficiency.

[0011] Other objects and advantages of the invention will be obvious and will be apparent from the specification.

[0012] In order to achieve the above object, the present invention is directed to an installation structure for a vehicle-mounted unit wherein a vehicle-mounted unit includes at least two brackets and a bolt through-hole formed in each bracket. The vehicle-mounted unit is installed in an interior of a vehicle body by inserting supporting bolts into the bolt through-holes and screwing a threaded-bore member onto each of the supporting bolts. Each of the brackets has a slide passage that extends from an outer periphery of the bracket to the bolt through-hole to laterally guide the supporting bolt. Each of the slide passages is formed so that the vehicle-

mounted unit can be detachably supported on each of the supporting bolts in a direction perpendicular to the axis of the supporting bolt.

[0013] According to the above construction, the bracket has the slide passage extending from the outer periphery to the bolt through-hole. The slide passage serves to laterally guide the supporting bolt into the bolt through-hole. The slide passage is formed so that the vehicle-mounted unit can be detachably supported on the supporting bolt in a direction perpendicular to an axis of the supporting bolt. Accordingly, it is not necessary to detachably attach the vehicle-mounted unit to the supporting bolts in front of the attachment surface of the vehicle body (or rear surface of the unit). After loosening the threaded-bore member, the supporting bolts are laterally inserted into the slide passages in the direction perpendicular to the axis of the supporting bolt. Thus, it is not necessary to provide a working space in front of the vehicle-mounted unit upon attachment and detachment of the unit. In particular, when the vehicle-mounted unit is removed from an inner part of the interior of the vehicle body, it is not necessary to purposely remove any devices arranged in front of the vehicle-mounted unit.

[0014] Accordingly, it is possible for the vehicle-mounted unit to be attach to and detached from the inner part of the interior of the vehicle body readily and rapidly to enhance efficiency during repairing or exchanging the vehicle-mounted unit. Since the slide passages are communicated from their outer peripheries to the bolt through-holes, that is, the bolt through-holes are opened through the slide passages, it is possible to obtain the above effect by a simple construction.

[0015] In the present invention, an opening of the one slide passage at an outer periphery of the one bracket preferably faces to a direction different from an opening of the other slide passage at an outer periphery of the other bracket. According to the above construction, it is possible to prevent the vehicle-mounted unit from coming out of the supporting bolts, when an external

force is applied to the vehicle-mounted unit in the directions of the openings of the slide passages. That is, by facing an opening of the one slide passage at an outer periphery of the one bracket in a direction different from an opening of the other slide passage at an outer periphery of the other bracket. Thus, the vehicle-mounted unit must be moved in at least two axial directions in order to remove the vehicle-mounted unit from the supporting bolts. Accordingly, it is possible to prevent the vehicle-mounted unit from eventually coming out from the supporting unit.

[0016] In the present invention, the slide passages are preferably formed into straight-line configurations. These simple configurations make it easy to form the slide passages. In the case where the slide passages are formed into straight-line configurations, the vehicle-mounted unit is attached to a standing wall surface by two brackets. The one slide passage is opened at a lower position in the one bracket. The other slide passage is opened at a side position of the other bracket.

[0017] Furthermore, at least one of the slide passages is provided on an inner periphery with a resilient latch rib that restrains the supporting bolt from passing through the slide passage. According to this construction, the resilient latch rib restrains the supporting bolt from passing through the slide passage and prevents the bolt from eventually coming out from the slide passage. Consequently, the vehicle-mounted unit can be stably attached to the interior of the vehicle body.

[0018] The resilient latch rib is not limited in a detailed construction. For example, the resilient latch rib may be provided on each of opposite side edges of the inner periphery of the slide passage.

[0019] In the present invention, if the brackets are formed into thin plate-like configurations, it is possible to break the brackets, if necessary. For example, upon exchange of the vehicle-mounted unit, it is possible to remove the installed vehicle-mounting unit from the vehicle body by breaking the bracket, thereby exchanging and repairing the vehicle-mounted unit more readily and rapidly.

[0020] The present invention can be generally applied to the installation structure for the vehicle-mounted unit. In particular, the present invention can be preferably applied to the structure where a second vehicle-mounted unit is attached to an attachment surface opposite from that of a first vehicle-mounted unit.

[0021] In the present invention, the supporting bolts are stud bolts secured perpendicular to a wall surface in an interior of a vehicle body. In the case where the above stud bolts are used as the supporting bolts, it is preferable that a latch flange is provided on at least a part of the periphery of the bolt through-hole or the slide passage in the bracket to engage a valley of a thread on the supporting bolt. According to the above construction, when the vehicle-mounted unit is attached to the wall surface in the interior of the vehicle body, in particular, the standing wall surface inclined forwardly with respect to a vertical direction, the latch flange engages the stud bolt. This temporarily holds the vehicle-mounted unit on the stud bolt at the desired position. When the threaded-bore members are screwed onto the stud bolts under this condition, the vehicle-mounted unit can be easily attached to the wall surface in the interior of the vehicle body. Thus, where inner surfaces of the bolt through-hole and slide passage are formed into flat surfaces, the vehicle-mounted unit will fall down along the stud bolts if the stud bolts are directed downwardly with respect to the horizontal direction. Accordingly, a worker must fasten the nut on the stud bolt with one hand while holding the vehicle-mounted unit with the other

hand. This will lower workability. On the other hand, by providing the latch flange on the slide passage, it is possible to engage the latch flange with the valley of the thread to temporarily hold the vehicle-mounted unit on the stud bolts when the stud bolts are inserted into the bolt through-holes or the slide passages. This will enhance workability.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The features of the present invention believed to be novel and the elements characteristic of the present invention are set forth with particularity in the appended claims. The figures are for illustration purposes only and are not drawn to scale. The invention itself, however, both as to organization and method of operation, may best be understood with reference to the following detailed description taken in conjunction with the accompanying drawings in which:

[0023] Figure 1 is a front elevation view of an embodiment of an installation structure for a PJB (vehicle-mounted unit) in accordance with the present invention;

[0024] Figure 2 is a side elevation view of the installation structure for the PJB (vehicle-mounted unit);

[0025] Figure 3A is an enlarged front elevation view of a first bracket of the PJB in the installation structure for the PJB;

[0026] Figure 3B is an enlarged front elevation view of a second bracket of the PJB in the installation structure for the PJB;

[0027] Figure 4A is a sectional view of the first bracket taken along a line IV-IV in Figure 3A;

[0028] Figure 4B is an enlarged view of a part circled in Figure 4A;

[0029] Figure 5 is a plan explanatory view that illustrates a position in which the PJB is being removed from the installation structure for the PJB;

[0030] Figure 6A is a front elevation view of a conventional installation structure for a PJB (vehicle-mounted unit); and

[0031] Figure 6B is a side elevation view of the conventional installation structure for the PJB (vehicle-mounted unit).

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0032] In describing the preferred embodiments of the present invention, reference will be made herein to Figures 1 to 5 of the drawings in which like numerals refer to like features of the invention. Features of the invention are not necessarily shown to scale in the drawings.

[0033] A preferred embodiment of an installation structure for a vehicle-mounted unit in accordance with the present invention will be described below by referring to the drawings.

[0034] Figure 1 is a front elevation view of an embodiment of an installation structure for a vehicle-mounted unit in accordance with the present invention. Figure 2 is a side elevation view of the installation structure for the vehicle-mounted unit.

[0035] This installation structure for a vehicle-mounted unit includes a standing wall surface 1 in an interior of a vehicle body and a vehicle-mounted unit or a PJB (Printed-circuit-board Junction Box) 2 attached to the standing wall surface 1.

[0036] Although in this embodiment the vehicle-mounted unit is directed to a JP (junction box) or a PJB 2, in which electronic circuits or spliced circuits are formed on a printed board, the present invention is not limited to the JP or PJB. For example, the present invention can be generally applied to a vehicle-mounted unit, such as an electronic control unit for an engine or a brake, or peripheral units for an audio system, such as an amplifier. This vehicle-mounted unit is

installed on an inner part, in particular, the rearmost part of a vehicle body and a second vehicle-mounted unit is disposed in front of a first vehicle-mounted unit.

[0037] The standing wall on which the PJB 2 is installed on in an interior of the vehicle body is provided on a rear side of an instrument panel (not shown). A wall on which the PJB 2 is installed is inclined forwardly, that is, toward the installation side of the PJB 2 with respect to a vertical direction to define an inclined standing wall surface 1.

[0038] A plurality of bolts are welded perpendicular to the standing wall surface 1, on which the PJB 2 is installed, to form stud bolts 3. That is, the stud bolts 3 stand perpendicular to the standing wall surface 1 so that a distal end of each stud bolt 3 is directed slightly downward with respect to a horizontal direction. These stud bolts 3 are inserted into bolt through-holes 23 in brackets 21 and 22 (described after) of the PJB 2 in order to support the vehicle-mounted unit or PJB 2. The stud bolts 3 may also be referred to as supporting bolts. The stud bolts 3 are arranged in accordance with the bolt through-holes 23 in the brackets 21 and 22 of the PJB 2. The stud bolt 3 is defined as a bolt that is welded on a wall surface. The stud bolt 3 is threaded on a whole length or a given length of its outer periphery.

[0039] As described above, the PJB 2 is a kind of a JB to be installed on a vehicle body. Various kinds of electronic units (not shown) are electrically connected to the PJB 2. As shown in Figures 1 and 2, the PJB 2 includes a substantially rectangular PJB body 20. Plate-like brackets 21 and 22 extend outwardly from an upper left side edge of the PJB body 2 and a lower right side edge, respectively. Reinforcement triangle pieces 24 are each coupled to a side surface of the PJB body 20 at one side edge and to the bracket 21 or 22 at the other side edge.

[0040] The PJB body 20 is a hollow box made of a synthetic resin material. An interior space of the hollow box can be opened. A printed board on which various kinds of electronic parts, such

as a relay, and an FET (field-effect transistor), are mounted to form an electronic device circuit or a spliced circuit is contained in the interior of the hollow box.

[0041] As shown in Figures 1 to 3, the brackets 21 and 22 are formed into substantially thin plate-like bodies. Each of the brackets 21 and 22 includes a central bolt through-hole 23 into which a shaft of the stud bolt 3 is inserted. A slide passage 25 extends from a side edge of an outer periphery of each bracket to the bolt through-hole 23. Accordingly, the respective brackets 21 and 22 have slots extending to their central portions.

[0042] The respective brackets 21 and 22 are larger than a hexagonal nut 4 that engages the stud bolt 3. The respective brackets 21 and 22 are larger than a diameter of a circle that is coaxial with the bolt through-hole 23 and is equal to a diagonal distance of the hexagonal nut 4. The hexagonal nut 4 has a threaded bore. When the hexagonal nut 4 is screwed onto the stud bolt 3, the PJB 2 is secured to the standing wall surface 1. Accordingly, the hexagonal nut 4 corresponds to a threaded-bore member.

[0043] The bolt through-hole 23 formed in each of the brackets 21 and 22 is slightly larger than a diameter of the shaft of the stud bolt 3, so that the stud bolt 3 is easily inserted into the bolt through-hole 23. As shown in Figures 3A and 3B, the bolt through-hole 23 is opened laterally through the slide passage 25.

[0044] A width of the slide passage 25 is equal to the diameter of the bolt through-hole 23 and thus is larger than the diameter of the shaft of the stud bolt 3. When the PJB 2 moves relative to the stud bolts 3, the stud bolts 3 inserted in the bolt through-holes 23 moves laterally into the slide passages 25 relative to the PJB 2. Thus, the PJB 2 is removed from the respective brackets 21 and 22.

[0045] The brackets 21 and 22 will be described below in more detail. The detailed construction of the bracket 21 provided on the upper left side edge of the PJB body 20 is slightly different from the bracket 22 provided on the lower right side edge of the body 20.

[0046] The bracket provided on the upper left side edge of the PJB body 20 is referred to as the first bracket 21 below, while the bracket provided on the lower right side edge of the body 20 is referred to as the second bracket 22 below. It should be noted that an arrangement and the number of the brackets 21 and 22 are not limited to the present embodiment. They can be altered in view of the detachable possibility, an attaching position, an attaching stability (for example, a center of gravity), or the like in the PJB 2.

[0047] As shown in Figure 3A, the slide passage 25 is opened at a side (a right side in Figure 1) of the first bracket 21. As shown in Figures 4A and 4B, latch flanges 27 are provided on upper and lower edges of the bolt through-hole 23 and the slide passage 25 in the first bracket 21. The latch flanges 27 engage valleys of a thread on the stud bolt 3. The latch flanges 27 have given heights and are provided on inner peripheral surfaces of the bolt through-hole 23 and slide passage 25 to project inwardly (toward the inner peripheral surfaces). The distal end edges of the latch flanges 27 engage valleys of the thread on the stud bolt 3. The latch flanges 27 may be provided on either bolt through-hole 23 or slide passage 25. The latch flange 27 may be provided on either upper edge or lower edge of the slide passage 25.

[0048] In summary, a detailed structure of the latch flange is not limited to the above embodiment. Any type of a latch flange can be utilized if the latch flange 27 engages the stud bolt 3 to prevent the vehicle-mounted unit 2 from coming out of the stud bolts 3, when the stud bolts 3 are inserted in the bolt through-holes 23 or the slide passages 25. Accordingly, a distance between the latch flanges 27 on the upper and lower edges of the slide passage 25 is set to be

smaller than a diameter of the thread on the stud bolt 3. The upper and lower latch flanges 27 may engage crests of the thread on the stud bolt 3.

[0049] In the other hand, the second bracket 22, as shown in Figure 3B, the slide passage is opened downwardly. In the second bracket 22, as shown in Figure 3B, resilient latch ribs 26 are provided on the slide passage 25. The resilient latch ribs 26 (four ribs in this embodiment) are provided on upper and lower inner sides. The resilient latch ribs 26 serve to restrain the stud bolt 3 from laterally sliding. When a given external force is applied to the ribs 26, the ribs 26 are elastically deformed to permit lateral sliding of the stud bolt 3. After the given external force deforms the resilient latch ribs 26, all or a part of them may return to the original positions by their elastic recovery nature to restrain the stud bolt 3 from sliding laterally in the slide passage.

[0050] As shown in Figure 3B, each resilient latch rib 26 is inclined in a direction from the bolt through-hole 23 to an inlet or outlet port of the slide passage 25. A pair of upper resilient latch ribs 26 are formed into arcuate shapes on the opening edge of the bolt through-hole 23 to extend along the outer periphery of the stud bolt 3. Thus, the respective stud bolts 3 are stably secured in the bolt through-holes 23.

[0051] The above brackets 21, 22 and slide passages 25 in the brackets are mutually adjusted so that the PJB 2 can be attached to and detached from the respective stud bolts 3 in a direction perpendicular to the axes of the respective stud bolts 3. Thus, arrangement positions of the brackets 21 and 22 for the PJB 2, and configurations and opening directions of the slide passages 25 enable an individual stud bolt 3 to laterally enter each slide passage 25. For example, if the respective slide passages are opened in the opposite directions from each other, the PJB 2 cannot move in a vertical direction relative to the stud bolts 3, since the stud bolts 3 will interfere with the PJB 2. Accordingly, the respective brackets 21, 22 and slide passages 25 in the brackets 21,

22 are mutually adjusted so that the PJB 2 can be attached to and detached from the axes of the stud bolts 3 in the vertical directions with respect to the axes of the bolts 3. Further, taking into a direction of detaching the PJB 2, attaching and detaching works, the preferable directions of openings of the slide passages 25 are determined.

[0052] In the present embodiment, the first bracket 21 is opened at the right side while the second bracket 22 is opened at a lower side. Widths of the slide passages 25 in the respective brackets 21 and 22 are set to be larger than a diameter of a shaft of the stud bolt 3. The stud bolts 3 are gradually moved laterally relative to the slide passages 25 while repeating a sequential sliding operation of the first bracket 21 and a turning operation of the second bracket 22. Consequently, the PJB 2 can be removed from the stud bolts 3 in the direction perpendicular to the axes of the bolts.

[0053] Next, a process of producing the PJB 2 of the embodiment in accordance with the present invention will be described below.

[0054] Firstly, during a process of producing a vehicle body on which the PJB 2 is installed, that is, on a line producing the vehicle body, the PJB 2 is attached to the standing wall surface 1 at a relatively earlier stage of the process. In more detail, a plurality of bolts (two bolts in this embodiment) are welded at desired positions on the standing wall surface 1 to form stud bolts 3. The stud bolts 3 are inserted in an axial direction into the bolt through-holes 23 in the brackets 21 and 22 of the PJB 2 to dispose the PJB 2 on the standing wall surface 1. At this time, the PJB 2 is temporarily secured to the stud bolt 3 at the desired position by the flanges 27 in the first bracket 21. Under this condition, the hexagonal nuts 4 are screwed onto the respective stud bolts 3 and the PJB 2 is regularly secured on the standing wall surface 1.

[0055] A wire harness extending from another vehicle-mounted unit is electrically connected to the PJB 2. Various kinds of devices, such as a blower motor, an air duct, and a car-audio equipment, are disposed in front of the PJB 2. An instrument panel is put on the PJB 2 and the other components to cover them.

[0056] Next, a process of an exchange or a repair of the PJB 2 will be described below. Here, the PJB 2 has passed over its endurance limit or has encountered a failure in use.

[0057] The hexagonal nuts 4 are loosened and removed from the stud bolts 3 by a tool such as a wrench. As shown by an arrow A in Figure 5, firstly, the PJB 2 is moved into the slide passage 25 in the first bracket 21. The stud bolt 3 slides in a laterally outwardly direction in the slide passage 25. Simultaneously, the PJB 2 is turned around the slide passage 25 in the second bracket 22. Thus, the stud bolt 3 slides laterally outwardly in the slide passage 25, as shown by arrow B in Figure 5. Then, the PJB 2 is drawn out gradually from the stud bolts 3 in the direction perpendicular to the axes of the shafts of the stud bolts 3. The resilient latch ribs 26 in the second bracket 22 are deformed by the stud bolt 3 or a suitable tool (not shown) to permit the stud bolt 3 to slide laterally in the slide passage 25 in the second bracket 22. In the case where the PJB 2 should be exchanged for a new one, the old PJB 2 may be removed from the stud bolts 3 after the resilient latch ribs 26 are broken by a suitable tool or the like. Also, the first and second brackets 21 and 22 may be broken, if necessary, since they are formed into thin plate-like members, in cases where the PJB 2 is exchanged for a new one. This exchange of the PJB 2 can be carried out readily and rapidly, as circumstances demand.

[0058] The newly exchanged PJB 2 or repaired PJB 2 is again attached to the standing wall surface 1. In more detail, the PJB 2 is attached to the standing wall surface 1 by reversing the removing process of the PJB 2 described above. However, the second bracket 22 must be

gradually attached to the stud bolt 3 by means of a force that does not break the resilient latch ribs 26.

[0059] As described above, according to the installation structure for the PJB 2, the respective brackets 21 and 22 have slide passages 25 extending from the outer peripheries to the bolt through-holes 23. The slide passage 25 serves to laterally guide the stud bolt 3 into the bolt through-hole 23. The slide passage 25 is formed so that the PJB 2 can be detachably supported on the stud bolts 3 in the direction perpendicular to the axes of the stud bolts 3. Accordingly, it is not necessary to detachably attach the PJB 2 to the stud bolts 3 in front of the attachment surface of the vehicle body (or rear surface of the PJB 2). After loosening the hexagonal nuts 4, the stud bolts 3 are laterally inserted into the slide passages 25 in the direction perpendicular to the axes of the stud bolts 3. Thus, it is not necessary to provide a working space in front of the PJB upon attachment and detachment of the PJB 2. In particular, when the PJB is removed from an inner part of the interior of the vehicle body, it is not necessary to purposely remove any devices arranged in front of the PJB 2. Accordingly, it is possible for the PJB to be attached to and detached from the inner part of the interior of the vehicle body readily and rapidly and to enhance efficiencies during repair or exchange of the PJB 2. Since the slide passages 25 communicate through their outer peripheries to the bolt through-holes 23, i.e., the bolt through-holes 23 are opened through the slide passages 25, it is possible to obtain the above effect by a simple construction.

[0060] Since the slide passages 25 in the first and second brackets 21 and 22 are opened to the outer peripheries of the brackets in different directions, it is possible to prevent the stud bolts 3 from coming out of all of the brackets 21 and 22 when the PJB 2 moves in an axial direction. For example, if the respective slide passages 25 are opened at the right side, the PJB 2 is easily

drawn out of the stud bolts 3 by moving the PJB 2 to the left side. This will lower stability during attachment. However, in the above construction of the present invention, the PJB 2 cannot be removed from the stud bolts 3 unless the PJB 2 is moved in at least two directions (upper and lower directions). Accordingly, it is possible to more firmly attach the PJB 2 to the vehicle body. Furthermore, since the resilient latch ribs 26 in the second bracket 22 laterally restrains the stud bolt 3 from sliding, it is possible to prevent the second bracket 22 from coming out of the stud bolt 3 and to stably hold the PJB 2 on the vehicle body.

[0061] Although the installation structure for the PJB 2 (vehicle-mounted unit) is described in the above embodiment, the installation structure for the vehicle-mounted unit is not limited to the above embodiment. It is possible to modify the structure in various manners without departing from the spirit of the present invention. For example, the following modifications will be fallen within the scope of the present invention.

[0062] In the above embodiment, the slide passages 25 in the respective brackets 21 and 22 extend along straight lines from the respective bolt through-holes 23 to the outer peripheries of the respective brackets 21 and 22. The configurations of the slide passages 25 are not limited to straight-line shapes. The slide passages 25 may have arcuate shapes, serpentine shapes, serrated shapes, or the like. For example, in the above embodiment, the second slide passage 25 in the second bracket 22 may be in the form of an arcuate shape around a center of the first bolt through-hole 23 in the first bracket 21. When the PJB 2 is turned about the first stud bolt 3 in the first bolt through-hole 23 in the first bracket 21, the second stud bolt 3 is drawn out of the second bracket 22. Then, when the PJB 2 is slid in the first slide passage 25 in the first bracket 21, the first stud bolt 3 is drawn out of the first bracket 21. Consequently, the PJB 2 can be removed from the stud bolts 3 in a direction perpendicular to the axes of the stud bolts 3. Thus, the

respective slide passages 25 are adjusted so that the PJB 2 can be attached to and detached from the stud bolts 3 in the direction perpendicular to the axes of the bolts.

[0063] The slide passages 25 are opened to the outer peripheries of the brackets 21 and 22 in a direction different from those in the above embodiment. For example, the openings of the slide passages 25 in the outer peripheries of the brackets 21 and 22 are faced to the same direction.

[0064] Although the resilient latch ribs 26 are inclined in the directions from the bolt through-hole 23 to the outer side opening of the slide passage 25 in the above embodiment, the inclining directions of the resilient latch ribs are not limited to the above embodiment. The resilient latch ribs may be inclined in an opposite direction from those in the above embodiment or may not be inclined.

[0065] In the above embodiment, the stud bolts secured perpendicular to the standing wall surface in the interior of the vehicle body are used as the supporting bolts and the hexagonal nuts are used as the threaded-bore member. A screwing construction comprising the supporting bolts and threaded-bore members is not limited to the above embodiment. For example, hexagonal-head bolts may be used as the supporting bolts and elements having treaded-bores and formed in the standing wall may be used as the threaded-bore members. The hexagonal-head bolts may be screwed into the threaded-bores in the standing wall to attach the vehicle-mounted unit on the standing wall surface. However, in the case where the stud bolts are used as the supporting bolts, it is preferable to provide the latch flanges on the slide passages 25 to temporarily hold the vehicle-mounted unit on the standing wall surface 1 when the latch flanges 27 engage the stud bolts 3. Thus, the latch flanges 27 can temporarily hold the vehicle-mounted unit on the desired positions on the stud bolts 3. Since the nut members can be screwed onto the stud bolts under

the condition, it is possible to attach the vehicle-mounted unit on the standing wall surface in the interior of the vehicle body.

[0066] While the present invention has been particularly described, in conjunction with a specific preferred embodiment, it is evident that many alternatives, modifications, and variations will be apparent to those skilled in the art in light of the foregoing description. It is therefore contemplated that the appended claims will embrace any such alternatives, modifications, and variations as falling within the true scope and spirit of the present invention.

[0067] The description of the invention is merely exemplary in nature and, thus, variations that do not depart from the gist of the invention are intended to be within the scope of the invention. Such variations are not to be regarded as a departure from the spirit and scope of the invention.